

**National Climatic Data Center**

**DATA DOCUMENTATION**

**FOR**

**DATA SET 9614 (DSI-9614)**

**AEROSOL OBSERVATION FILE (SST EIGHT DAY)**

**December 16, 2002**

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**1. Abstract:** NOAA has been producing sea surface temperatures (SSTs) from satellite data since 1972. Monitoring of sea surface temperature (SST) from earth-orbiting infrared radiometers has had a wide impact on oceanographic science. Currently, one of the principal sources of infrared data for SST measurement is from the Advanced Very High Resolution Radiometer (AVHRR) carried on NOAA's [Polar Orbiting Environmental Satellites](#) (POES), beginning in 1978. AVHRR is a broad-band, four or five channel (depending on the model) scanner, sensing in the visible, near-infrared, and thermal infrared portions of the electromagnetic spectrum. The POES satellite system offers the advantage of daily global coverage, by making near-polar orbits roughly 14.1 times daily. In-situ SSTs, from buoys (drifting and moored) are used operationally to maintain accuracy -- removing any biases, and compiling statistics with time (1,2,3).

In this data set, each aerosol observation file contains eight days of Sea Surface Temperature (SST) observations containing an optical thickness parameter calculated from the Griggs algorithm. The SSTs in these observations are "aerosol-corrected" SSTs, but the uncorrected SSTs are also contained within the observation. This data file consists of 4002 physical records, each with a length of 13024 bytes.

The organization of the file is as follows: earth is divided into 5E by 5E blocks and by 1E by 1E sub-blocks within each block. The blocks are numbered from 1 to 2592, with the origin or first block being at 180E West or -180 and 90E South or -90. Block numbers increase by 1 to the East and by 72 to the North. To locate information in an area, the block number is found which corresponds to the block encompassing the area. A table in the directory record points to the record that contains the desired block. After locating the record containing the block, another table at the beginning of the record locates the proper location of the desired sub-block.

The file has overflow records, and as such, expands and contracts as data are available.

The first record is the **directory record** containing the block directory and other information. All other records are **data records**, each containing a sub-block directory followed by observations.

## **2. Element Names and Definitions:**

### **DIRECTORY RECORD FORMAT**

This record describes the size, origin, and location of the blocks making up the file. To calculate the block number of a location (ILAT, ILON), use the following formula:

$$\text{IBLOCK} = ((\text{ILAT} - \text{LA}) / \text{LAO} * \text{INBC}) + ((\text{ILON} - \text{LO}) / \text{LOO}) + 1$$

Where:

INBC = Number of Column Blocks = 360/LOO

LA = Latitude origin of file = -90

LO = Longitude origin of file = -180

LAO = Size of block in latitudinal direction in degrees = 5

LOO = Size of block in longitudinal direction in degrees = 5

ILAT = Latitude (+N, -S)

ILON = Longitude (+E, -W)

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NOTE: To find INTEGER ILAT and ILON, round up if positive and down if negative.

NOTE: Each block includes the minimum whole latitude and longitude and excludes the maximum whole latitude and longitude which border the block.

For example: The limits of block 1 are:

-90.0 to -85.01 and -180.0 to -175.01

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## Directory Record Format

<u>Half Word #</u>	<u>Description</u>	<u>Comments</u>
1	Latitude Origin	-90
2	Longitude Origin	-180
3	Size of block in latitudinal direction	In degrees currently 5
4	Size of block in longitudinal direction	In degrees currently 5
5	First free record pointer	Points to first available record
6	Number of records in file	Currently 4002
7	Halfword number of start of block directory table	Currently 11
8	Day of year of latest data	1-366
9	File availability	0 = available 1 = unavailable update in progress
10	Year of century of latest data	0-99
11	Record number for block 1	2-4002
12	Record number for block 2	0 if no data in block

## DATA RECORD FORMAT

<u>Half Word #</u>	<u>Description</u>	<u>Comments</u>
1	Record Number	2-4002
2	Block Number	1-2592
3	Extent number (# of records removed from primary)	0 if primary
4	Pointer to succeeding overflow record	0 if no overflow. Last overflow record points to primary.
5	Pointer to halfword position of start of observation data	61 currently

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6	Pointer to start of sub-block directory	11 currently
7	Lower left latitude of block	degrees
8	Lower left longitude of block	degrees
9	Pointer to last halfword containing data	If no data in the record, this pointer points to the start position of observation data -1
10	Unused	
11	Halfword of start of data for sub-block #1	
0 if no data for this sub-block in this record12	Halfword of end of data for sub-block #1	0 if no data for this sub-block in this record. Other extents may or may not contain data for this sub-block.
13-60	Similar to halfwords 11 and 12 for remaining sub-blocks	
61-6512	Observation data	

If the observations for a block cannot fit on one record, as many additional records (extents) are allocated as needed. Each additional record having the subdirectory and sub-documentation included. If the sub-block is known to be empty for the current record, the start and end position contain a 0. Sub-blocks may cross record boundaries. If an entire sub-block cannot fit into one record, it will be split, a new record being allocated for the remainder of the sub-block. Unused portions of the records and records containing no data are 0 filled

Given IX longitude and IY latitude, the sub-block number (SBN) can be calculated as follows:

$$\text{SBN} = (\text{IY} - \text{LLA}) * \text{LOO} + \text{IX} - \text{LLL} + 1$$

This assumes all sub-blocks are 1E boxes. Here LLA and LLL are respectively the lower left latitude and longitude for the 5E block.

Simplifying the above:  $\text{SBN} = \text{IY} * \text{LOO} + \text{IX} + \text{C}$

Where  $\text{C} = -\text{LLA} * \text{LOO} - \text{LLL} + 1$  is previously determined.

The observation units are of variable size and have the general format as

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follows:

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## SATELLITE AEROSOL/SST OBSERVATION FORMAT

Satellite Aerosol/SST Observations are variable lengths with a minimum length of 28 full (32-byte) words and maximum of 48 full words. The observation length must be an even number of full words with no odd full word except the first full word being negative. The first odd full word of an observation is always negative. The first three words contain identification information including the type of algorithm used, the satellite, time, and location. The fourth full word contains the SST and the reliability assigned to the observation.

### FORMAT OF THE FIRST 28 FULL WORDS

<u>Half Word</u>	<u>Byte</u>	<u>Quantity</u>	<u>Range</u>
1	1	Type of Observation (Table 1)	129-255
1	2	Source of Observation (Table 2)	0-255
2	3	Year of Century     0-99	
2	4	Month of Year     1-12	
3	5-6	Latitude (+N, -S) * 100-9000 to 9000	
4	7-8	Longitude (+E, -W) * 100	-18000 to 17999
5	9	Day of Month	1-31
5	10	Hour of Day	0-23
6	11	Minute of Hour	0-59
6	12	Second of Minute	0-59
7	13-14	Aerosol-corrected SST-20 to 350 (EC*10)	
8	15-16	Reliability 0 to 32767	
9	17-18	Solar Zenith Angle (E*10) (Negative to left of spacecraft track, positive to right)	0 to 1800
11	21-22	Analyzed Field SST (EC*10)	-20 to 350
12	23-24	Internal Error (RMS*100)	0 to 1000
13	25-26	Relative Azimuth Angle (E*10)	0 to 1800
14	27-28	Climatological SST (EC*10)	-20 to 350
15	29	Beginning Row of Unit Array	1-11
15	30	Beginning Column of Unit Array	1-11
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16	31-32	AVHRR Channel 1 Average (%*100)	0-10000
17	33-34	AVHRR Channel 2 Average (%*100)	0-10000
18	35-36	AVHRR Channel 3 Average (EK*100)	0-32767
19	37-38	AVHRR Channel 4 Average (EK*100)	0-32767
20	39-40	AVHRR Channel 5 Average (EK*100)	0-32767
21	41-42	Space View SDEV Channel 1 (%*100)	0-10000
22	43-44	Space View SDEV Channel 2 (%*100)	0-10000
23	45-46	Space View SDEV Channel 3 (EK*100)	0-32767
24	47-48	Space View SDEV Channel 4 (EK*100)	0-32767
25	49-50	Space View SDEV Channel 5 (EK*100)	0-32767
26	51-52	Algorithm Number	1011 to ?
27	53-54	Aerosol Optical Thickness *1000	0-2440
28	55-56	Uncorrected SST (EK*100)	27116-30816

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**IF HIRS DATA ARE APPENDED**

<b><u>Half</u></b>	<b><u>Word</u></b>	<b><u>Byte</u></b>	<b><u>Quantity</u></b>	<b><u>Range</u></b>
	29	57-58	HIRS Channel 1 Temp (EK*100)	0-32767
	30	59-60	HIRS Channel 2 Temp (EK*100)	0-32767
	31	61-62	HIRS Channel 3 Temp (EK*100)	0-32767
	32	63-64	HIRS Channel 4 Temp (EK*100)	0-32767
	33	65-66	HIRS Channel 5 Temp (EK*100)	0-32767
	34	67-68	HIRS Channel 6 Temp (EK*100)	0-32767
	35	69-70	HIRS Channel 7 Temp (EK*100)	0-32767
	36	71-72	HIRS Channel 8 Temp (EK*100)	0-32767
	37	73-74	HIRS Channel 9 Temp (EK*100)	0-32767
	38	75-76	HIRS Channel 10 Temp (EK*100)	0-32767
	39	77-78	HIRS Channel 11 Temp (EK*100)	0-32767
	40	79-80	HIRS Channel 12 Temp (EK*100)	0-32767
	41	81-82	HIRS Channel 13 Temp (EK*100)	0-32767
	42	83-84	HIRS Channel 14 Temp (EK*100)	0-32767
	43	85-86	HIRS Channel 15 Temp (EK*100)	0-32767
	44	87-88	HIRS Channel 16 Temp (EK*100)	0-32767
	45	89-90	HIRS Channel 17 Temp (EK*100)	0-32767
	46	91-92	HIRS Channel 18 Temp (EK*100)	0-32767
	47	93-94	HIRS Channel 19 Temp (EK*100)	0-32767
	48	95-96	HIRS Channel 20 Temp (%*100)	0-1000

**TABLE 1**  
**AEROSOL/SST OBSERVATION TYPE CODES**

<b><u>Code</u></b>	<b><u>Type</u></b>
157	Day Operational Algorithm
158	Day Operational Algorithm in relaxed cloud mode
167	Day Test Algorithm
168	Day Test Algorithm in relaxed cloud mode

**TABLE 2**  
**AEROSOL/SST OBSERVATION SOURCE CODES**

<b><u>Code</u></b>	<b><u>Source</u></b>
1	NOAA-11 AVHRR
100	Ship data from Navy (from FNMOC)
101	Buoy data from TIROS collection system
102	Fixed Weather Ship (from NMC)
103	Moving Ship with Name (from NMC)
104	Moving Ship without Name (from NMC)
105	Fixed Buoy (from NMC)
106	Drifting Buoy (from NMC)
107	XBT (from NMC)

3. **Start Date:** 19890706

4. **Stop Date:** Ongoing

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5. **Coverage:** Global.
6. **How to Order Data:**  
  
Ask NCDC's Climate Services about the cost of obtaining this data set.  
Phone: 828-271-4800  
FAX: 828-271-4876  
E-mail: [NCDC.Orders@noaa.gov](mailto:NCDC.Orders@noaa.gov)
7. **Archiving Data Center:**  
  
National Climatic Data Center  
Federal Building  
151 Patton Avenue  
Asheville, NC 28801-5001  
Phone: (828) 271-4800.
8. **Technical Contact:**  
  
National Climatic Data Center  
Federal Building  
151 Patton Avenue  
Asheville, NC 28801-5001  
Phone: (828) 271-4800.
9. **Known Uncorrected Problems:** None.
10. **Quality Statement:** No information provided in original documentation.
11. **Essential Companion Datasets:** None.
12. **References:** No information provided in original documentation.